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Periodontal Disease Status in a Population at Najran Province of Saudi Arabia

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ABSTRACT

Background: **The common periodontal diseases are of public health concern, with 20-50 percent of the global population affected by gingivitis and or periodontitis.**

Aim: **The aim of this study was to explore the common periodontal diseases occurring among the patients who attended the College of Dentistry hospital of Najran University. And also, to determine the correlation among the age groups, nationalities and risk factors related to periodontal diseases.**

Methods: **A retrospective hospital-based descriptive type study was performed, providing 352 records of male patients suffering from various types of periodontal diseases. The Centers for Disease Control and the American Academy of Periodontology (CDC-AAP) classification was used for periodontal diagnosis. Patients were grouped by age as group A (6-20 years), group B (21-40 years), group C (41-60 years) and group D (above 60 years). Chi-square test and multinomial logistic regression model were adapted for data analyses.**

Results: **Out of 352 patients, 217 (61%) and 135 (39%) patients suffered from gingivitis and periodontitis, respectively. Mean age of the patients was 32.81 ± 15.96 (range 6-97) years. Sixty-nine (19.6%), 200 (56.8%), 60 (17.0%) and 23 (6.5%) patients of Group A, B, C and D suffered from different forms of periodontal diseases, respectively. Eighty three percent patients were of Saudis and Yemenis and the rest were of Egyptian, Bangladeshi, Pakistani, Indian, Sudanese, Jordanian, Syrian, Chadian, Ghanaian and Tunisian nationalities. Highest number of patients suffered from moderate generalized gingivitis 142 (40.3%) and moderate localized periodontitis 57 (16.2%). Majority had plaque & calculus 290 (82.4%) and the rests had diabetes mellitus, smoking and tobacco chewing habit, asthma, hypertension and heart disease. Correlations among periodontal disease, age group and risk factor were found significant (p <0.05) though between the nationality and risk factor was found not significant (p 0.999).**

Conclusions: **Significant relationships were observed among periodontal diseases and age, nationality and risk factors. This small study of Najran may reflect the periodontal status in a population of Saudi Arabia. Further broad scale study would be conclusive establishing such relationship in Saudi Arabian population.**

Keywords: Gingivitis, periodontitis, risk factors, correlation, Najran, Saudi Arabia.

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I. Introduction

Common periodontal diseases such as gingivitis and periodontitis are one of the most prevalent oral disorders affecting the human population [1]-[3]. The incidence of periodontal disease is high, with up to 20-50% of the population worldwide affected by gingivitis or periodontitis [4], [5]. According to recent findings from the Centers for Disease Control and Prevention of USA, half of Americans aged 30 or older have periodontitis, the more advanced form of periodontal disease [5], [6]. High prevalence of periodontal disease in adolescents, adults and older individuals makes it a public health concern [7].

Global Burden of Disease (GBD) study provides information on disease prevalence, incidence, and severity by age, sex, geography, and time. GBD (1990–2015) indicates that the severe periodontal disease affected 538 million people; and total tooth loss affected 276 million people worldwide [8]. Severe periodontal disease was the 11th most prevalent condition in the world based on GBD 2016 [2]. During the last few decades, the burden of periodontal disease has risen significantly, and a wide body of evidence indicates that it is closely associated with systemic diseases [5], [7].

Gingivitis is characterized by red, easily bled edematous gingiva and, if left untreated, the deeper periodontal tissues are implicated in the production of periodontitis that eventually ends in tooth loss [9]. Poor oral hygiene is created by local factors such as bacterial plaque and CALCULUS, which directly irritate periodontal tissues to cause periodontal diseases [10], [11]. Periodontal tissue is also directly affected by smoking and using tobacco products [5], [12], [15]. Systemic conditions and disorders are now considered to be the secondary factors that modulate periodontal disease initiation or progression. Periodontal diseases are evidently linked to common systemic conditions such as diabetes, cardiovascular disease, adverse pregnancy effects, rheumatoid arthritis, chronic obstructive pulmonary disease, chronic kidney disease (CKD), hypertension, multi-organ cancers, etc. [16]-[23]. Local and systemic risk factors play a major predisposing role in the periodontal disease pathogenesis process, influencing the quality of life (QoL) of patients as well [24].

In adults aged 30-40 years, the overall prevalence of periodontitis increases with age and the incidence rises steeply. With the increasing aging population, this burden of periodontitis would continue to increase [25], [26]. While comprehensive studies have been conducted on the prevalence of periodontal diseases in different populations worldwide, data for the Saudi population is poor. Muhammad Nazir et al. [2] suggest that the high prevalence of periodontal disease in the increasingly advancing elderly population justifies the incorporation of programs and policies for the prevention of periodontal disease into general health preventive measures that should start at local, national and international levels.

Prevalence is the number of cases of a disease in a designated population at a given point. This would be an effort of the College of Dentistry at Najran University to conduct a research regarding periodontal status among the dental patients attended the outpatient department since January to December of 2018. Using the research results, a greater effort can be made in providing periodontal health information to the population for raising awareness and to take preventive measures at or around Najran province of Kingdom of Saudi Arabia.

II. Materials and Methods

A. Examiner Calibration

Intraoral exams were conducted by qualified and calibrated dental practitioners at the Division of Periodontology, Faculty of Dentistry of Najran University.

B. Study Design

This research was planned as a retrospective hospital-based descriptive type study to determine the prevalence of periodontal diseases and potential disease-related risk factors.

C. Study Population

A convenience sample was examined of 961 records of patients who visited the College of Dentistry at Najran University's outpatient department (OPD) between January and December 2018. The informed consent was signed by all subjects before their enrollment in the study. Each case was diagnosed as no periodontal disease, gingivitis, and periodontitis and associated risk factors on the basis of periodontal parameters recorded. This study results were obtained from the analysis of 352 samples.

Based on the Canadian Health Measures Survey (2007-2009), the measurement of loss of periodontal ligament attachment is considered the gold standard in reporting the prevalence of periodontal disease.[27] National Health and Nutrition Examination Survey (NHANES) determined the attachment loss (AL) and probing depth (PD) at six sites of all teeth (excluding third molars) for the estimation of periodontal disease in the U.S. [28].

D. Study Method

An observation was made based on:

1. Periodontal diseases prevalence in the different nationalities and age.
2. Prevalence of gingivitis and periodontitis types.
3. Risk factors for periodontal diseases.
4. Association of age, nationality and risk factors with different types of periodontal diseases.
5. Analysis expressed.

The criteria developed by the Centers for Disease Control and the American Academy of Periodontology (CDC-AAP) were followed to identify subjects with periodontitis.[29,30] Periodontal diagnosis criteria: 1) Mild periodontitis- ≥3 mm CAL (clinical attachment loss) in two or more interproximal sites and two or more sites with ≥ 4 mm PD (probing depth); Or one site with PD ≥5 mm; 2) Moderate periodontitis- ≥2 interproximal sites with ≥4 mm CAL (not on the same tooth), Or ≥2 sites with ≥5 mm PD (not on the same tooth); and 3) Severe periodontitis- ≥2 interproximal sites with ≥6 mm CAL (not detected on the same tooth) and ≥1 interproximal sites with ≥5 mm PD.

The gingival index (GI) was calculated based on the Ramfjord teeth index [31] as: healthy gingiva, GI score- <0.1; mild gingivitis- GI = 0.1-1; moderate gingivitis- GI = 1.1-2; and severe gingivitis- GI = 2.1-3.

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E. Statistical Analysis

Obtained data were coded, entered, and analyzed using the Statistical Package for Social Sciences (SPSS, version 23, IBM Corp, Armonk, NY, USA). Descriptive analysis was done to summarize data as numbers and percentages. Significance testing of differences was done using the chi-squared test and t-test to compare data of nominal or interval level, respectively. Multinomial logistic regression analysis was performed to analyze the factors associated with periodontal diseases. All statistical assessments were two-tailed and considered significant at $p < 0.05$.

III. Results:

Nine hundred and sixty-one patients' records were examined to find out the cases with different types of periodontal diseases. Of them, 352 (36.63%) patients were found sufferers of different types of gingivitis (217 (61%)) and periodontitis (135 (39%)). Mean age of the periodontal diseases sufferers was 32.81±15.96 (range 6-97) years.

Table I shows that the Group A (6-20 years) consisted 69 (19.6%) patients, Group B (21-40 years) 200 (56.8%), Group C (41-60 years) 60 (17.0%) and Group D (above 60 years) 23 (6.5%) patients.

TABLE I: Distribution of Age Groups of Patients Suffered from Periodontal Diseases

Age group	Frequency	Percent (%)
Group A (6-20 Years)	69	19.6
Group B (21-40 Years)	200	56.8
Group C (41-60 Years)	60	17.0
Group D (Above 60 Years)	23	6.5
Total	352	100

Table II shows the patients of different nationalities who suffered from periodontal diseases. The Saudi nationals were 164 (46.6%), Yemeni 128 (36.4%), Egyptian 16 (4.5%), Bangladeshi 10 (2.8%), Pakistani 11 (3.1%), Indian 9 (2.6%), Sudanese 7 (2.0%), Jordanian 2 (0.6%), Syrian 2 (0.6%) patients, and Chadian, Ghanaian and Tunisian patients were only 1 (0.3%) of each nationality.

TABLE II: Distribution of Nationality of Patients Suffered from Periodontal Diseases

Nationality	Frequency	Percent (%)
Saudi	164	46.6
Yemeni	128	36.4
Egyptian	16	4.5
Sudanese	7	2.0
Pakistani	11	3.1
Indian	9	2.6
Jordanian	2	0.6
Bangladeshi	10	2.8
Chadian	1	0.3
Syrian	2	0.6
Ghanaian	1	0.3
Tunisian	1	0.3
Total	352	100

In Table III, the total gingivitis cases were found 217 (61%). Among those, mild generalized gingivitis cases were 61 (17.3%), moderate generalized gingivitis 142 (40.3%), severe generalized gingivitis 5 (1.4%), puberty gingivitis 2 (0.6%) and acute generalized gingivitis were 7 (2.0%). Total periodontitis cases were 135 (39%). Among those, mild generalized periodontitis cases were 4 (1.1%), moderate generalized periodontitis 45 (12.8%), severe generalized periodontitis 19 (5.4%), mild localized periodontitis 7 (2.0%), moderate localized periodontitis 57 (16.2%), severe localized periodontitis 2 (0.6%) and aggressive periodontitis was 1 (0.3%).

TABLE III: Distribution of Periodontal Diseases

Periodontal Disease	Frequency	Percent (%)
Mild generalized gingivitis	61	17.3
Moderate generalized gingivitis	142	40.3
Severe generalized gingivitis	5	1.4
generalized puberty gingivitis	2	0.6
Acute generalized gingivitis	7	2.0
Mild generalized periodontitis	4	1.1
Moderate generalized periodontitis	45	12.8
Severe generalized periodontitis	19	5.4
Mild localized periodontitis	7	2.0
Moderate localized periodontitis	57	16.2
Severe localized periodontitis	2	0.6
Aggressive periodontitis	1	0.3
Total	352	100

Out of 352 (100%) patients, plaque & calculus were found in 290 (82.4%) patients (Table IV). Followed by the patients had diabetes mellitus (DM) 17 (4.8%), smoking 14 (4.0%) and tobacco chewing 3 (0.9%) habits, asthma 6 (1.7%), hypertension 6 (1.7%), DM + hypertension 5 (1.4%), heart disease 3 (0.9%), Asthma + Smoking 2 (0.6%), DM + asthma, DM + aspirin, adenoidectomy, deaf and unknown were 1 (0.3%) of each risk factors.

TABLE IV: Distribution of Risk Factors in Patients Suffered from Periodontal Diseases

Risk factors	Frequency	Percent (%)
Plaque & calculus	290	82.4
Asthma	6	1.7
Smoking	14	4.0
Asthma + Smoking	2	0.6
Adenoidectomy	1	0.3
DM + Aspirin	1	0.3
Anaemia	1	0.3
DM	17	4.8
Hypertension	6	1.7
Heart Disease	3	0.9
Disability	1	0.3
Tobacco chewing	3	0.9
DM + Hypertension	5	1.4
DM + Asthma	1	0.3
Unknown	1	0.3
Total	352	100.0

Table V shows that out of 352 (100.0%) patients, majority 143 (39.8%) suffered from moderate generalized gingivitis, followed by 58 (17.1%), 57 (16.0%), 45 (12.6%), 19 (5.3%), 9 (2.0%), 7 (2.0%), 5 (1.4%), 4 (1.1%) patients suffered from mild generalized gingivitis, moderate localized periodontitis, moderate generalized periodontitis, severe generalized periodontitis, mild localized periodontitis, acute generalized gingivitis, severe generalized gingivitis and mild generalized periodontitis, respectively. Two (0.60%) patients of each suffered from Puberty gingivitis and severe localized periodontitis, and only 1 (0.30%) patient suffered from aggressive periodontitis.

Sixty-nine (19.6%) patients in Group A (6-20 years) suffered from different forms of gingivitis and periodontitis. Of them, 28 (40.6%) and 27 (39.1%) patients suffered from moderate generalized gingivitis and mild generalized gingivitis, respectively. There were 7 (10.1%), 4 (5.8%), 2 (2.9%) and 1 (1.5%) patient suffered from moderate localized periodontitis, acute generalized gingivitis, puberty gingivitis and mild localized periodontitis, respectively.

In Group B (21-40 years), out of 200 (56.0%) patients, 97 (48.5%), 43 (21.5%) and 27 (13.5%) patients suffered from moderate generalized gingivitis, moderate localized periodontitis and mild generalized gingivitis, respectively. Whereas 12 (6.0%), 5 (2.5%), 4 (2.0%), 4 (2.0%), 3 (1.5%),

and 1 (1.5%) patient suffered from moderate generalized periodontitis, mild localized periodontitis, severe generalized gingivitis, severe generalized periodontitis, acute generalized gingivitis, and aggressive periodontitis, respectively.

Group C (41-60 years) shows that out of 60 (17.1%) patients, 19 (31.7%) patients suffered from moderate generalized periodontitis. Fourteen (23.3%), 10 (16.7%), 7 (11.7%), 4 (6.7%), 2 (3.3%), 2 (3.3%) and 1 (1.7%) patient suffered from moderate generalized gingivitis, severe generalized periodontitis, moderate localized periodontitis, mild generalized periodontitis, severe localized periodontitis, severe generalized gingivitis and mild localized periodontitis, respectively.

Out of 23 (7.0%) patients in Group D (Above 60 years), 12 (52.2%) patients suffered from moderate generalized periodontitis. And 5 (21.7%), 4 (17.4%) and 2 (8.7%) patients suffered from severe generalized periodontitis, moderate generalized gingivitis and mild generalized periodontitis, respectively.

Correlation between age group and disease diagnoses was found significant (p <0.05).

TABLE V: CORRELATION BETWEEN AGE GROUP AND PERIODONTAL DISEASES

Age group	Group A (6-20 Years)	Count	27	28	0	2	4	0	0	0	1	7	0	0	69
		within Diagnosis	47.50	19.00	0.00	100.0	57.10	0.00	0.00	0.00	14.30	12.30	0.00	0.00	19.9
		of Total	8.10	7.60	0.00	0.60	1.10	0.00	0.00	0.00	0.30	2.00	0.00	0.00	19.9
	Group B (21-40 Years)	Count	27	97	4	0	3	0	14	4	7	43	0	1	200
		within Diagnosis	44.30	68.30	80.00	0.00	42.90	0.00	26.70	21.10	71.40	75.40	0.00	100.0	56.0
		of Total	7.60	27.20	1.10	0.00	0.80	0.00	3.40	1.10	1.40	12.00	0.00	0.30	56.0
	Group C (41-60 Years)	Count	4	14	1	0	0	2	19	10	1	7	2	0	60
		within Diagnosis	8.20	9.90	20.00	0.00	0.00	50.00	42.20	52.60	14.30	12.30	100.0	0.00	17.10
		of Total	1.40	3.90	0.30	0.00	0.00	0.60	5.30	2.80	0.30	2.00	0.60	0.00	17.10
	Group D (Above 60 Years)	Count	0	4	0	0	0	2	12	5	0	0	0	0	23
		within Diagnosis	0.00	2.80	0.00	0.00	0.00	50.00	31.10	26.30	0.00	0.00	0.00	0.00	7.00
		of Total	0.00	1.10	0.00	0.00	0.00	0.60	3.90	1.40	0.00	0.00	0.00	0.00	7.00
Total		Count	58	143	5	2	7	4	45	19	9	57	2	1	352
		within Diagnosis	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
		of Total	17.10	39.80	1.40	0.60	2.00	1.10	12.60	5.30	2.00	16.00	0.60	0.30	100.0

0.000

Table VI shows that 290 (82.4%) out of 352 patients who suffered from different forms of periodontal diseases had plaque & calculus. Seventeen (4.8%) patients were suffering from diabetes mellitus (DM), 14 (3.9%) were smokers, 6 (1.7%) patients had asthma and 6 (1.7%) patients had hypertension. Five (1.4%) patients had a combination of DM and hypertension. Rest of the patients [19 (10.1%)] had heart disease, anaemia, tobacco chewing habit, and so on. Group-wise results found that 63 (91.3%), 170 (85.0%), 44 (73.3%) and 8 (34.8%) patients concerned to groups A, B, C and D, respectively had plaque & calculus. Plaque & calculus percentages were found chronologically high to low scales from group A towards D. Whereas, DM and hypertension were found chronologically high to low scales from the higher to lower age groups i.e., groups D towards A. Patients had asthma and DM plus asthma in the relatively younger age groups (A and B). Tobacco chewing habit was also found in groups B and C. Correlation between age group and risk factors related to periodontal disease was found significant (p <0.05).

Patients with various forms of periodontal diseases in Table VII had plaque & calculus. One hundred and thirty-four (81.7%) Saudi patients possessed plaque & calculus out of 164 patients, followed by Egyptians (13 (81.3%) out of 16), Yemenis (100 (78.1%) out of 128), Indians (7 (77.8%) out of 9) and Bangladeshis (7 (70.0%) out of 10). All patients (100%) of Pakistanis, Sudanese, Jordanians, Syrians, Chadians, Ghanaians, and Tunisians had plaque & calculus. Diabetic and hypertensive patients were more among the Saudis and Yemenis. Smoking and tobacco chewing habits were observed more in Yemenis and then Saudis. Asthmatic patients were more in Saudis. Minimum quantities were found for other risk factors due to negligible numbers of other nationalities. Correlation between nationality and risk factors related to periodontal disease was found not significant (p 0.999).

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TABLE VI: CORRELATION BETWEEN AGE GROUPS AND RISK FACTORS

			Risk factors																P-value
			Plaque & calculus	Asthma	Smoking	Asthma + Smoking	Adenoidectomy	*DM + Aspirin	Anaemia	*DM	Hypertension	Heart Disease	Disability	Tobacco chewing	*DM + Hypertension	*DM + Asthma	Unknown	Total	
Age group	Group A (6-20 Years)	Count	63	2	2	0	0	0	0	0	0	0	0	0	0	0	2	69	0.000
		within Risk factor	22.4	33.3	14.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	19.9	
		of Total	18.2	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	19.9	
	Group B (21-40 Years)	Count	170	2	9	2	1	0	1	4	2	1	1	2	1	0	4	200	
		within Risk factor	58.6	33.3	64.3	100.0	100.0	0.0	100.0	23.5	33.3	33.3	100.0	66.7	20.0	0.0	66.7	56.0	
		of Total	47.6	0.6	2.5	0.6	0.3	0.0	0.3	1.1	0.6	0.3	0.3	0.6	0.3	0.0	1.1	56.0	
	Group C (41-60 Years)	Count	44	1	3	0	0	0	0	7	1	1	0	1	2	0	0	60	
		within Risk factor	15.5	16.7	21.4	0.0	0.0	0.0	0.0	41.2	16.7	33.3	0.0	33.3	40.0	0.0	0.0	17.1	
		of Total	12.6	0.3	0.8	0.0	0.0	0.0	0.0	2.0	0.3	0.3	0.0	0.3	0.6	0.0	0.0	17.1	
	Group D (Above 60 Years)	Count	8	1	0	0	0	1	0	6	3	1	0	0	2	1	0	23	
		within Risk factor	3.4	16.7	0.0	0.0	0.0	100.0	0.0	35.3	50.0	33.3	0.0	0.0	40.0	100.0	0.0	7.0	
		of Total	2.8	0.3	0.0	0.0	0.0	0.3	0.0	1.7	0.8	0.3	0.0	0.0	0.6	0.3	0.0	7.0	
	Total	Count	285	6	14	2	1	1	1	17	6	3	1	3	5	1	6	352	
		within Risk factor	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
		of Total	81.2	1.7	3.9	0.6	0.3	0.3	0.3	4.8	1.7	0.8	0.3	0.8	1.4	0.3	1.7	100.0	

TABLE VII: CORRELATION BETWEEN NATIONALITY AND RISK FACTORS (1-2)

			Risk factors																P-value
			Plaque & calculus	Asthma	Smoking	Asthma + Smoking	Adenoidectomy	*DM + Aspirin	Anaemia	*DM	Hypertension	Heart Disease	Disability	Tobacco chewing	*DM + Hypertension	*DM + Asthma	Unknown	Total	
Nationality	Saudi	Count	134	3	4	1	1	1	0	9	2	1	1	0	3	1	3	164	0.999
		% within Risk factor	46.9	50.0	28.6	50.0	100.0	100.0	0.0	52.9	33.3	33.3	100.0	0.0	60.0	100.0	50.0	46.5	
		%of Total	38.1	0.8	1.1	0.3	0.3	0.3	0.0	2.5	0.6	0.3	0.3	0.0	0.8	0.3	0.8	46.5	
	Yemeni	Count	100	0	8	1	0	0	1	7	4	2	0	2	1	0	2	128	
		% within Risk factor	35.2	0.0	57.1	50.0	0.0	0.0	100.0	41.2	66.7	66.7	0.0	66.7	20.0	0.0	33.3	36.4	
		%of Total	28.6	0.0	2.2	0.3	0.0	0.0	0.3	2.0	1.1	0.6	0.0	0.6	0.3	0.0	0.6	36.4	
	Egyptia	Count	13	2	1	0	0	0	0	0	0	0	0	0	0	0	0	16	
		% within Risk factor	4.5	33.3	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	
		%of Total	3.6	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	
	Sudanes	Count	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	
		% within Risk factor	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	
		%of Total	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	
	Pakistan	Count	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	
		% within Risk factor	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1	
		%of Total	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1	
	Indian	Count	7	0	1	0	0	0	0	1	0	0	0	0	0	0	0	9	
		% within Risk factor	2.4	0.0	7.1	0.0	0.0	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	
		%of Total	2.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	

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TABLE VII: CORRELATION BETWEEN NATIONALITY AND RISK FACTORS (2-2)

			Risk factors																P-value
			Plaque & calculus	Asthma	Smoking	Asthma + Smoking	Adenoidectomy	*DM + Aspirin	Anaemia	*DM	Hypertension	Heart Disease	Disaility	Tobacco chewing	*DM + Hypertension	*DM + Asthma	Unknown	Total	
Nationality	Jordanian	Count	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.999
		% within Risk factor	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	
		%of Total	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	
	Bangladeshi	Count	7	1	0	0	0	0	0	0	0	0	0	1	1	0	0	10	
		% within Risk factor	2.4	16.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	20.0	0.0	0.0	2.8	
		%of Total	2.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	2.8	
	Chadian	Count	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
		% within Risk factor	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	
		%of Total	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	
	Syrian	Count	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
		% within Risk factor	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	
		%of Total	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	
	Ghanaian	Count	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
		% within Risk factor	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	
		%of Total	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	
	Tunisian	Count	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
		% within Risk factor	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	
		%of Total	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	
	Total	Count	286	6	14	2	1	1	1	17	6	3	1	3	5	1	5	352	
		% within Risk factor	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
		%of Total	81.2	1.7	3.9	0.6	0.3	0.3	0.3	4.8	1.7	0.8	0.3	0.8	1.4	0.3	1.7	100.0	

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TABLE VIII: CORRELATION BETWEEN NATIONALITY AND PERIODONTAL DISEASE

			Mild generalized gingivitis	Moderate generalized gingivitis	Severe generalized gingivitis	generalized puberty gingivitis	Acute generalized gingivitis	Mild generalized periodontitis	Moderate generalized periodontitis	Severe generalized periodontitis	Mild localized periodontitis	Moderate localized periodontitis	Severe localized periodontitis	Aggressive periodontitis	Total	P- value
Nationality	Saudi	Count	36	72	1	2	6	2	15	5	3	22	0	0	164	0.000
		% within Risk factor	59.0	50.7	20.0	100.0	85.7	50.0	33.3	26.3	42.9	38.6	0.0	0.0	46.5	
		% of Total	10.1	20.2	0.3	0.6	1.7	0.6	4.2	1.4	0.8	6.2	0.0	0.0	46.5	
	Yemeni	Count	21	45	4	0	1	1	21	9	2	21	2	1	128	
		% within Risk factor	34.4	31.7	80.0	0.0	14.3	25.0	46.7	47.4	28.6	36.8	100.0	100.0	36.4	
		% of Total	5.9	12.6	1.1	0.0	0.3	0.3	5.9	2.5	0.6	5.9	0.6	0.3	36.4	
	Egyptian	Count	2	8	0	0	0	0	3	0	0	3	0	0	16	
		% within Risk factor	3.3	5.6	0.0	0.0	0.0	0.0	6.7	0.0	0.0	5.3	0.0	0.0	4.5	
		% of Total	0.6	2.2	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.8	0.0	0.0	4.5	
	Sudanese	Count	2	2	0	0	0	0	1	0	0	2	0	0	7	
		% within Risk factor	3.3	1.4	0.0	0.0	0.0	0.0	2.2	0.0	0.0	3.5	0.0	0.0	2.0	
		% of Total	0.6	0.6	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.6	0.0	0.0	2.0	
	Pakistani	Count	0	7	0	0	0	0	0	0	2	2	0	0	11	
		% within Risk factor	0.0	4.9	0.0	0.0	0.0	0.0	0.0	0.0	28.6	3.5	0.0	0.0	3.1	
		%of Total	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.0	0.0	3.1	
	Indian	Count	0	4	0	0	0	0	1	1	0	3	0	0	9	
		% within Risk factor	0.0	2.8	0.0	0.0	0.0	0.0	2.2	5.3	0.0	5.3	0.0	0.0	2.5	
		% of Total	0.0	1.1	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.8	0.0	0.0	2.5	
	Jordanian	Count	0	1	0	0	0	0	0	0	0	1	0	0	2	
		% within Risk factor	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.6	
		% of Total	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.6	
	Bangladeshi	Count	0	1	0	0	0	0	3	4	0	2	0	0	10	
		% within Risk factor	0.0	0.7	0.0	0.0	0.0	0.0	6.7	21.1	0.0	3.5	0.0	0.0	2.8	
		% of Total	0.0	0.3	0.0	0.0	0.0	0.0	0.8	1.1	0.0	0.6	0.0	0.0	2.8	
	Chadian	Count	0	1	0	0	0	0	0	0	0	0	0	0	1	
		% within Risk factor	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	
		% of Total	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	
	Syrian	Count	0	1	0	0	0	0	0	0	0	1	0	0	2	
		% within Risk factor	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.6	
		% of Total	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.6	
	Ghanaian	Count	0	0	0	0	0	1	0	0	0	0	0	0	1	
		% within Risk factor	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	
		% of Total	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	
	Tunisian	Count	0	0	0	0	0	0	1	0	0	0	0	0	1	
		% within Risk factor	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.3	
		% of Total	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3	
Total		Count	61	142	5	2	7	4	45	19	7	57	2	1	352	
		% within Risk factor	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
		% of Total	17.1	39.8	1.4	0.6	2.0	1.1	12.6	5.3	2.0	16.0	0.6	0.3	100.0	

Out of 164 Saudi patients, 72 (43.9%) suffered from moderate generalized gingivitis (Table VIII). Followed by mild generalized gingivitis 36 (22.0%), moderate localized periodontitis 22 (13.4%), moderate generalized periodontitis 15 (9.1%), acute generalized gingivitis 6 (3.7%), severe generalized periodontitis 5 (3.0%), mild localized periodontitis 3 (1.8%), mild generalized periodontitis 2 (1.2%), puberty gingivitis 2 (1.2%) and severe generalized gingivitis 1 (0.6%).

One hundred twenty-eight Yemeni patients suffered from different types of periodontal diseases. Of them, 45 (35.2%) patients suffered from moderate generalized gingivitis, 21 (16.4%) patients suffered from each of mild generalized gingivitis, moderate generalized periodontitis and moderate localized periodontitis, 9 (7.0%) severe generalized periodontitis, 4 (3.1%) severe generalized gingivitis, 2 (1.6%) patients suffered from each of mild localized periodontitis and severe localized periodontitis, and 1 (0.8%) patients suffered from each of acute generalized gingivitis, mild generalized periodontitis and aggressive periodontitis. Of the 16 Egyptians, 8 (50.0%) patients suffered from moderate generalized gingivitis, 3 (18.8%) patients suffered from each of moderate generalized periodontitis and moderate localized periodontitis and 2 (12.5%) patients suffered from mild generalized gingivitis.

Eleven Pakistanis suffered from moderate generalized gingivitis (7 (63.6%)), mild localized periodontitis (2 (18.2%)) and moderate localized periodontitis (2 (18.2%)). Out of 10 Bangladeshis, 4 (40.0%) patients had severe generalized periodontitis, 3 (30.0%) moderate generalized periodontitis, 2 (20.0%) moderate localized periodontitis and 1 (10.0%) patient had moderate generalized gingivitis. Nine Indians suffered from moderate generalized gingivitis (4 (44.4%)), moderate localized periodontitis {3 (33.3%)), moderate generalized periodontitis (1 (11.1%)) and severe generalized periodontitis (1 (11.1%)). Out of 7 Sudanese, 2 (28.6%) patients suffered from each of mild generalized gingivitis, moderate generalized gingivitis and moderate localized periodontitis, and 1 (14.3%) patient suffered from moderate generalized periodontitis. The number of Jordanian, Syrian, Chadian, Ghanaian and Tunisian patients who also suffered from various types of periodontal disease was negligible (Table IX).

Correlation between nationality and periodontal diseases was found significant ($p < 0.05$).

TABLE IX: EFFECTS OF PERIODONTAL DISEASE ON NATIONALITY, RISK FACTORS AND AGE GROUP

Model	Chi-Square	df	P-Value
Nationality	43.809	144	1.000
Risk factor	122.728	168	0.997
Age group	69.130	36	0.001

Table XI expresses the effects of periodontal disease on nationality, risk factors and age group. The P-value (1.000 and 0.997) is >0.05 – Null hypothesis is accepted. Null hypothesis- there is no significant difference (not-predictable) in between dependent variable (periodontal disease) and independent variable (nationality and risk factors). On the other hand, P-value (0.001) is <0.05 – Null hypothesis rejected. Null hypothesis- there is significant difference (predictable) in between dependent variable (periodontal disease) and independent variable (age group).

IV. DISCUSSION

Gingivitis and periodontitis are widespread periodontal diseases, often with a prevalence that affects 20-50 percent of the world's population. [4], [5] Amare Tefera Biruk Bekele (2020) diagnosed periodontal disease in 42.4% of Ethiopian patients.[32] The current study found 36.6% patients suffered from different types of gingivitis (61%) and periodontitis (39%).

Age can increase vulnerability to the onset and progression of periodontal disease and, thus, age is used as a risk factor in risk assessment tools for preventing the progression of periodontal disease.[33] The aim of the present study was attempted to generate periodontal diseases with age-dependent thresholds. Patients were grouped by age as group A (6-20 years), B (21-40 years), C (41-60 years), and group D (>60 years) in this study. Adolescents with the highest prevalence of no periodontal disease (21.2%) compared to adults (9.3%) and the older population (9.7%) ($P = 0.005$) were reported by Muhammad Nazir et al., 2020[2]. In the current study, only 19.6% of group A patients suffered from periodontal diseases (Table V) and the overwhelming majority (79.7%) suffered from gingivitis and only 1.5% of patients had mild localized periodontitis. Group B (21-40 years) consisted 56.0% patients in this research (Table V). Majority (62.0%) of this group suffered from moderate (48.5%) and mild (13.5%) generalized gingivitis, and 21.5% patients suffered from moderate localized periodontitis. In group C (41-60 years), 71.8% patients suffered from different types of periodontitis and the rest (28.2%) suffered from gingivitis. The group D (>60 years) showed the highest rate (82.6%) of periodontitis patients (Table V). Goyal et al.;2019 found that localized chronic periodontitis was the most prevalent in the age group of 25-45 years (44.03%), while generalized chronic periodontitis was observed in the 46-65 age group (12.88%) [34]. In Hossain MZ et al. [25] study, the prevalence and severity of gingivitis was found increased with age to a peak in the 21-30 years age group, whereas periodontitis increased significantly ($p<0.001$) in subjects above the age of 40 years in a population of Abha city of Saudi Arabia. So that, the results of the current study are in accordance with the findings of [2], [34] and [25] studies. It is apparent that the prevalence of periodontal disease has risen with age. Thus, in this study, the association between the age group and periodontal disease was found to be significant ($p<0.05$) (Table V).

An evaluation of risk factors should include periodontal diagnosis. Poor oral hygiene combined with plaque and calculus accumulation resulting in gingivitis ultimately leading to periodontitis if left untreated [9]. Periodontal examination was performed on 343 adults attending the outpatient clinics of the Faculty of Dentistry, Cairo University [12]. They found that 58.9% of participants had calculus deposits. The present study analyzed 82.4% of patients with plaque & calculus (Table IV). Kiran Kumar Ganj in the 2017 study observed maximum (53%) calculus in group I (30-40 years) and minimum (21%) in group IV (60 years and above) [35]. Group-wise findings in the current study showed that 91.3%, 85.0%, 73.3% and 34.8% patients

affected by groups A, B, C and D had plaque & calculus, respectively. The percentages of plaque & calculus were found chronologically lower than those of higher age groups, i.e., high to low scales from group A to D (Table VI). The risk factors and markers of periodontal disease include smoking, stress, aging, race or ethnicity, and male gender [15]. Smoking and tobacco use habits among male patients of different nationalities with different types of periodontal diseases were identified in this research (Table VI & VII).

Data shows that periodontal disorders are integrated with systemic diseases and older people suffer more than younger ones.[16]-[23] This research explored the chronologically high to low scales of DM and hypertension from the higher to lower age groups, i.e., groups D to A. The patients in the comparatively younger age groups had asthma and DM plus asthma (A and B) (Table VI & VII).

Over the last 50 years, research has greatly enhanced our understanding of the biological mechanisms of periodontal diseases. Existing expertise in this area can be further enhanced by scientific collaborations between committed practitioners and comprehensive international older age groups. Significant relationships were observed between periodontal diseases and nationality, age, and risk factors. Future broad scale study would be conclusive establishing such relationship in Saudi Arabian population.

V. Conclusion

This small study in Najran region may reflect the periodontal status in a population of Saudi Arabia. patients suffered from gingivitis were of younger age groups, whereas patients having periodontitis wee of cooperation on research activities.

Declarations of interest

The authors declare hey do not have conflict of interest.

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